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(71)Applicant : KONAMI CO LTD

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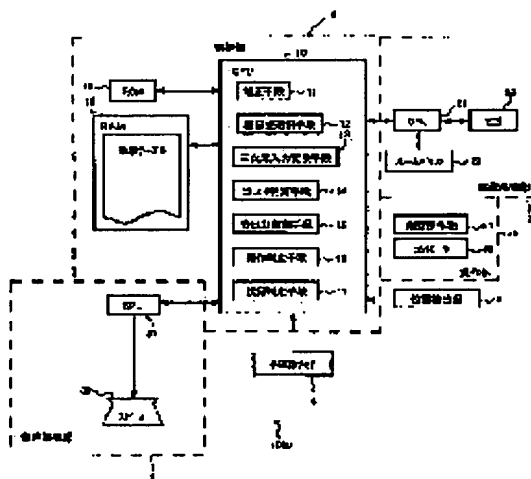
(72)Inventor : YAMASHITA AKIHISA
NAGATOMI MASATO
YAMAMOTO KENICHI
KOTANI HIDEO

(54) GAME DEVICE AND GAME PROGRAM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a game device capable of giving touches of actuality.

SOLUTION: A game system is provided with a sword type real operation object 51. The position in a real space of the sword type real operation object 51 is detected by a position detection part 6 and converted to game space coordinates by three-dimensional input conversion means 13. When a player moves the sword type operation object 51, the movement of a sword object within a game space is displayed similarly to the movement of the sword type operation object 51. The movement of the sword object is stored as a past position in the game space. On the basis of the stored position, whether or not it has hit another object in the game space is judged. The player plays a game without feeling the incompatibility of the real space and the game space through an operation by himself/herself rather than operating the object within the game space.



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CLAIMS

[Claim(s)]

[Claim 1] It is game equipment which transposes the real actuation object which the player in real space operates to the virtual actuation object in a virtual space, and is displayed on a display. A location detection means to detect the location (henceforth a real space location) of said real actuation object in said real space, A conversion means to change said detected real space location into the location in said virtual space (henceforth a virtual space location), and to determine the display position of said virtual actuation object on said display based on said virtual space location, Game equipment equipped with a means of operation to display a motion of said virtual actuation object on said display by making detection of said real space location by said location detection means, and the display position of said virtual actuation object by said conversion means determine for deltaT every predetermined time interval.

[Claim 2] Said location detection means is game equipment according to claim 1 which said conversion means changes said real space coordinate into the three-dimensions coordinate in said virtual space (henceforth a virtual space coordinate) further, and determines the display position of said virtual actuation object on said display based on said virtual space coordinate by specifying further the three-dimensions coordinate (henceforth a real space coordinate) of said real actuation object in said real space.

[Claim 3] An intersection display-control means for said location detection means to detect the real space coordinate of at least two points of said real actuation object, to compute the location of the intersection of the straight line in said real space to which said two points are connected, and said display, and to display said intersection on said display, It is game equipment according to claim 2 further equipped with a selection reception means to judge whether the candidate for a display currently displayed on said intersection and said display laps, and to receive selection for a display when having lapped.

[Claim 4] A 1st locus storage means to memorize said virtual space location computed between the predetermined time spacing deltaT2 ($\text{deltaT2} > \text{deltaT1}$), Based on said virtual space location memorized by said 1st locus storage means, the locus and rate of said virtual actuation object are computed. Game equipment according to claim 1 further equipped with a hit judging means to specify said object when it judges whether the object which exists in said virtual space based on said locus and rate, and said virtual actuation object hit and both hit.

[Claim 5] A 2nd locus storage means to memorize said virtual space location computed between predetermined time spacing deltaT3 ($\text{deltaT3} > \text{deltaT1}$), A command storage means to match and memorize the command executed with the predetermined locus pattern of said virtual actuation object, and said locus pattern, The locus of said virtual actuation object is computed based on the virtual space location memorized by said 2nd locus storage means. Game equipment according to claim 1 further equipped with a command execution means to execute the command corresponding to the congruous locus patterns when it judges whether said computed locus is in agreement with either of said locus patterns and is in agreement with one of locus patterns.

[Claim 6] A 3rd locus storage means to memorize said real space location detected between predetermined time spacing deltaT four ($\text{deltaT-four} > \text{deltaT1}$), A command storage means to match and memorize the command executed with the predetermined locus pattern of said real actuation object, and said locus pattern, The locus of said real actuation object is computed based on the real space location memorized by said 3rd locus storage means. Game equipment according to claim 1 further equipped with a command execution means to execute the command corresponding to the congruous locus patterns when it judges whether said computed locus is in agreement with either of said locus patterns and is in agreement with one of locus patterns.

[Claim 7] Game equipment according to claim 1 which detects the difference between the physique of said player, and predetermined normal build from the real space location of said real actuation object, and has further an amendment means to amend the virtual space location of said real actuation object, based on the detected difference.

[Claim 8] Said location detection means is game equipment including the luminescence means attached in said real actuation object, and a measurement means to measure the location of said luminescence means and to output a measurement result to said conversion means based on the light which detects the light from said luminescence means and which was detected with the photodetection means of a pair at least according to claim 1.

[Claim 9] It is the game approach used for the game equipment which transposes the real actuation object which the player in real space operates to the virtual actuation object in a virtual space, and is displayed on a display. The location detection step which detects the location (henceforth a real space location) of said real actuation object in said real space, The conversion step which changes said detected real space location into the location in said virtual space (henceforth a virtual space location), and determines the display position of said virtual actuation object on said display based on said virtual space location, The game approach containing the step of operation which displays a motion of said virtual actuation object on said display by making detection of said real space location by said location detection means, and the display position of said virtual actuation object by said conversion means determine for deltaT every predetermined time interval.

[Claim 10] It is the game program used for the computer which transposes the real actuation object which the player in real space operates to the virtual actuation object in a virtual space, and is displayed on a display. The location detection step which detects the location (henceforth a real space location) of said real actuation object in said real space, The conversion step which changes said detected real space location into the location in said virtual space (henceforth a virtual space location), and determines the display position of said virtual actuation object on said display based on said virtual space location, By making detection of said real space location by said location detection means, and the display position of said virtual actuation object by said conversion means determine for deltaT every predetermined time interval The game program which makes said computer perform the step of operation which displays a motion of said virtual actuation object on said display.

[Claim 11] The real actuation object which has a luminescence means to emit light in the light which can sense a location measurement means for the player of game equipment according to claim 1 to be the real actuation object operated in real space, to measure the location of said real actuation object in said real space, and to output a measurement result to said game equipment.

[Claim 12] A luminescence means to emit light in the light which can sense a location measurement means for the player of game equipment according to claim 1 to be the luminescence means attached in the real actuation object operated in real space, to measure the location of said real actuation object in said real space, and to output a measurement result to said game equipment.

[Claim 13] The luminescence means which the player of game equipment according to claim 1 is a location detection means to detect the location of the real actuation object operated in real space, and is attached in said real actuation object in said real space, The location detection means equipped with a measurement means to measure the location of the photodetection means of a pair and said luminescence [it is based on said detected light and] means in said real space of detecting the light from said luminescence means, and to output a measurement result to said game equipment, at least.

[Claim 14] The real actuation object which is the game system by which the player in real space performs a game in a virtual space, and said player operates in said real space, A display means to display the virtual actuation object which is a permutation object in said virtual space of said real actuation object, A location detection means to detect the location (henceforth a real space location) of said real actuation object in said real space, A coordinate transformation means to change said detected real space location into the location (henceforth a virtual space location) in said virtual space, and to determine the display position of said virtual actuation object on said display means based on said virtual space location, By making detection of said real space location by said location detection means, and the display position of said virtual actuation object by said coordinate transformation means determine for deltaT every predetermined time interval A game system equipped with a means of operation to display on said display means a motion of said virtual actuation object corresponding to a motion of said real actuation object operated by said player.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the game as which a motion of the object in game space is displayed according to actuation of a player.

[0002]

[Description of the Prior Art] Various games, such as a battle game which operates conventionally the operation game which flies a vehicle, an airplane, etc., the character showing a fighter or the player itself, etc. as a game as which a motion of the object in game space is displayed according to actuation of a player, and fights with an enemy, and a sport game which operates the character showing the player itself and performs a sport, are offered.

[0003] For example, if it is the operation game of an airplane, a player will control an airplane with the controller which imitated the control lever of an airplane, or the upper and lower sides and the arrow-head carbon button to a longitudinal direction. Moreover, if it is a battle game, a player will deliver an attack to an enemy with the directions carbon button which moves a fighter with said controller and arrow-head carbon button, and directs use of arms.

[0004] Furthermore, the game equipment with which a player controls a motion of a player character with an arrow-head carbon button or various directions carbon buttons, and performs a soccer game as an example of a sport game is offered.

[0005] The following boxing games are offered as one of the another sport games. First, a player is located on the predetermined location of real space, and equips with the globe connected to game equipment. An attack to the waging-war partner displayed from the view of a player on the display is delivered when a player projects a globe toward a screen. Defense of the attack from a waging-war partner is performed when a player dodges the body right and left in the predetermined location of real space.

[0006]

[Problem(s) to be Solved by the Invention] In the operation game mentioned above, the battle game, and the soccer game, the object in game space is operated by a player's pushing the carbon button prepared beforehand, or operating a bar. However, actuation of the object by actuation of a carbon button and a bar is disagreeable ***** which lacks in a reality more. First of all, the command which moves the object in game space in which direction beforehand is matched with the carbon button or the bar. Therefore, a motion of the object operated with a carbon button or a bar is only the combination of the pattern of operation beforehand decided by the game side.

[0007] The boxing game mentioned above is increasing the interest of a game in that a player's own punch actuation and actuation to avoid are reflected in game expansion. However, in this boxing game, the globe with which the player equipped is not displayed as an object in game space, or a motion of the player which avoided the attack from an enemy is not necessarily displayed as an object in game space. Therefore, a player is not visual sensed [that punch of a player asked the waging-war partner or that a waging-war partner's punch was avoidable, and] corporal, but there is a problem which cannot fully realize the reality of a boxing game.

[0008] That is, when the player which exists in real space operates the object in game space freely, the game equipment made to experience a reality and interest as if the player itself was in game space is not yet offered. This invention aims at offering a technique for the player which exists in real space operating the object in game space freely, and performing a game.

[0009]

[Means for Solving the Problem] In order to solve said technical problem, the 1st invention of this application is game equipment which transposes the real actuation object which the player in real space operates to the virtual actuation object in a virtual space, and is displayed on a display, and offers game equipment equipped with the means of following A-C.

A; A location detection means to detect the location (henceforth a real space location) of said real actuation object in said real space, B; The location [location / said / which was detected / real space] in said virtual space A conversion means to change for (calling it a virtual space location hereafter), and to determine the display position of said virtual actuation object on said display based on said virtual space location, C; a means of operation to display a motion of said virtual actuation object on said display by making detection of said real space location by said location detection means, and the display position of said virtual actuation object by said conversion means determine for deltaT every predetermined time interval.

[0010] The character as which a virtual actuation object expresses a sword, a bat, a racket, a golf club, a shield, and the player itself is mentioned. If a virtual actuation object is a sword, if a real actuation object is a shield, being formed in the shape of a shield is desirable in the shape of a sword. The game which has presence more can be offered by making a virtual actuation object and a real actuation object into a similar configuration. Since it is the same, it is desirable that a virtual actuation object makes a similar configuration a virtual actuation object and a real actuation object also in the sport game which are a bat, a racket, a golf club, etc. If a virtual actuation object is a character, it is possible to use a real actuation object as the object which a player puts on, for example, a hat, a globe, a belt, glasses, and footwear.

[0011] With the location detection means, the light emitting device prepared for example, in the real actuation object and at least one pair of CCD cameras fixed to the position are included. The real space location of the detected real actuation object is changed into the location in the virtual space where a game is performed. The display position on a display is computed from this virtual space location, and a virtual actuation object is displayed. Location detection of a real actuation object and count of the display position of a virtual actuation object are performed every predetermined time interval, for example, 16msec(s). Thereby, a motion of the real actuation object operated by the player is displayed on a display as actuation of a virtual actuation object. For example, supposing a player shakes a sword, the sword currently displayed will be shaken similarly.

[0012] In addition, a real actuation object may have more than one. For example, the case where the versus fighting game to which a player fights with an enemy using a sword and a shield, and players fight in collaboration with the enemy in a virtual space can be considered.

[0013] The 2nd invention of this application is set to said 1st invention. The A1; aforementioned location detection means The three-dimensions coordinate (henceforth a real space coordinate) of said real actuation object in said real space is specified as a pan. The B1; aforementioned conversion means Said real space coordinate is further changed into the three-dimensions coordinate in said virtual space (henceforth a virtual space coordinate), and the game equipment which determines the display position of said virtual actuation object on said display based on said virtual space coordinate is offered.

[0014] The location of a real actuation object is pinpointed with a three-dimensions coordinate with a location detection means. For example, if the predetermined real space coordinate of two points is detected, the location and direction of a real actuation object can be specified. If the predetermined real space coordinate of three points of a real actuation object is detected, the location of the field of a real actuation object can be pinpointed. For example, what is necessary is just to detect the location of two points of a real actuation object, when virtual actuation objects are rod-like objects, such as a sword and a bat. Moreover, when a virtual actuation object has the configuration of the shape of a field, such as a racket and a shield, the location of three points of a real actuation object is detected.

[0015] In addition, there are also the following approaches as the detection approach of a location. Real space and a virtual space are divided into the predetermined real smallness space and the virtual smallness space of magnitude, respectively, and the space identification information which pinpoints each smallness space is set up. The location of a real actuation object is pinpointed by real space identification information, and real space identification information is changed into virtual space identification information.

[0016] Said location detection means detects the real space coordinate of at least two points of said real actuation object. the 3rd invention of this application -- said 2nd invention -- setting -- A2; -- D; An intersection

display-control means to compute the location of the intersection of the straight line in said real space to which said two points are connected, and said display, and to display said intersection on said display, E; it judges whether the candidate for a display currently displayed on said intersection and said display laps, and when having lapped, the game equipment further equipped with a selection reception means to receive selection for a display is offered.

[0017] For example, if a carbon button predetermined in the condition of having pointed to one of difficulty by the real actuation object is pushed when the menu of difficulty selection is displayed on the display, the difficulty to which it pointed will be chosen. Moreover, a push on a carbon button predetermined in the condition of, for example, having pointed to the enemy currently displayed performs the predetermined attack on the enemy, for example, bombardment, and discharge of a throwing knife.

[0018] The 4th invention of this application is set to said 1st invention, and offers the game equipment further equipped with Following F and the means of G.

F; A 1st locus storage means to memorize said virtual space location computed between the predetermined time spacing ΔT_2 ($\Delta T_2 > \Delta T_1$), G; Based on said virtual space location memorized by said 1st locus storage means, the locus and rate of said virtual actuation object are computed. A hit judging means to specify said object when it judges whether the object which exists in said virtual space based on said locus and rate, and said virtual actuation object hit and both hit.

[0019] A locus storage means memorizes the virtual space coordinate measured in the less than 160 msec of past. Unlike the actuation actuation of the virtual actuation object determined by actuation to a real actuation object is instructed to be by the carbon button and operating lever of a controller, a direction and a rate are unspecified. Therefore, change of the location of the virtual actuation object within past fixed time amount is memorized, and the locus and rate of a virtual actuation object are computed from this change. Based on the locus and rate which were computed, it judges whether the object and virtual actuation object in a virtual space hit. moreover, since there were various classes of objects, such as buildings, such as natural objects, such as an enemy, a tree, and a bamboo, a house, and a wall, as for the hit judging means, the virtual actuation object hit what -- it specifies a thing.

[0020] The 5th invention of this application offers the game equipment further equipped with the means of Following H, and I and J in said 1st invention.

H; A 2nd locus storage means to memorize said virtual space location computed between predetermined time spacing ΔT_3 ($\Delta T_3 > \Delta T_1$), I; A command storage means to match and memorize the command executed with the predetermined locus pattern of said virtual actuation object, and said locus pattern, J; The locus of said virtual actuation object is computed based on the virtual space location memorized by said 2nd locus storage means. A command execution means to execute the command corresponding to the congruous locus patterns when it judges whether said computed locus is in agreement with either of said locus patterns and is in agreement with one of locus patterns.

[0021] When a motion of the virtual actuation object in a virtual space corresponds to a predetermined pattern, for example, a "crossbar", the command corresponding to the pattern, for example, "all of the less than 10m enemy in a virtual space are pushed down" down, is executed.

[0022] The 6th invention of this application offers the game equipment further equipped with the means of Following K, and L and M in said 1st invention.

K; A 3rd locus storage means to memorize said real space location detected between predetermined time spacing ΔT_{four} ($\Delta T_{\text{four}} > \Delta T_1$), L; A command storage means to match and memorize the command executed with the predetermined locus pattern of said real actuation object, and said locus pattern, M; The locus of said real actuation object is computed based on the real space location memorized by said 3rd locus storage means. A command execution means to execute the command corresponding to the congruous locus patterns when it judges whether said computed locus is in agreement with either of said locus patterns and is in agreement with one of locus patterns.

[0023] When a motion of the real actuation object in real space corresponds to a predetermined pattern, for example, a "crossbar", the command corresponding to the pattern, for example, "all of the less than 10m enemy in a virtual space are pushed down" down, is executed.

[0024] The 7th invention of this application offers the game equipment further equipped with the means of Following N in said 1st invention.

N; an amendment means to detect the difference between the physique of said player, and predetermined normal build, and to amend the virtual space location of said real actuation object based on the detected difference from the real space location of said real actuation object.

[0025] For example, if a player is the child who is the height of 90cm when height of 180cm is made into a criterion, the real actuation object which a player operates will be low displayed on a display, and there is a possibility of spoiling the interest of a game. Then, the physique difference of various players is absorbed, and the location of a real actuation object and the difference of a motion which are produced from the physique difference of a player are amended so that a virtual actuation object may be displayed similarly.

[0026] The 8th invention of this application offers the game equipment with which a location detection means is further equipped with the following means in said 1st invention.

The luminescence means, A4 which are attached in an A3; aforementioned real actuation object; a measurement means measures the location of said luminescence means based on the photodetection means of a pair, and the light of which A5; detection was done at least, and output a measurement result to said conversion means to detect the light from said luminescence means.

[0027] The photodetection means of a pair enables it at least to detect each coordinate of x in predetermined real space system of coordinates, y, and the z-axis. Specifically, a photodetection means is constituted using a CCD camera, a photosensor, etc. As a luminescence means, for example, an infrared light emitting device is mentioned. Since infrared radiation has directivity, it is good to form a luminescence means using two or more light emitting devices which emit light in the different direction.

[0028] The 9th invention of this application is used for the game equipment which transposes the real actuation object which the player in real space operates to the virtual actuation object in a virtual space, and is displayed on a display, and offers the game approach of performing the step of following A-C.

A; The location detection step which detects the location (henceforth a real space location) of said real actuation object in said real space, B; The location [location / said / which was detected / real space] in said virtual space. The conversion step which changes for (calling it a virtual space location hereafter), and determines the display position of said virtual actuation object on said display based on said virtual space location, C; the step of operation which displays a motion of said virtual actuation object on said display by making detection of said real space location by said location detection means, and the display position of said virtual actuation object by said conversion means determine for deltaT every predetermined time interval.

[0029] The 10th invention of this application offers the game program which makes a computer perform each step of said 9th invention. Moreover, the record medium which recorded this program and in which computer reading is possible is also contained in the range of this invention. Here, as a record medium in which computer reading is possible, the thing of the floppy (trademark) disk which can write a computer, a hard disk, semiconductor memory, CD-ROM, DVD, a magneto-optic disk (MO), and others is mentioned.

[0030] The 11th invention of this application offers the real actuation object which the player of the game equipment concerning said 1st invention operates in real space. This real actuation object has the luminescence means. This luminescence means measures the location of said real actuation object in said real space, and emits light in the light which can sense a location measurement means to output a measurement result to said game equipment.

[0031] This actuation object is equivalent to the real actuation object used for the game equipment concerning said 1st invention. For example, if real actuation objects are rod-like objects, such as a sword and a bat, the infrared light emitting device etc. is attached in two different points along with the center line of a real actuation object. When a real actuation object has a part for plane portions, such as a tennis racket and a shield, a light emitting device is attached in three points from which it differs for a plane portion. Real actuation objects may be objects operated when a player attaches to the body and moves, such as a hat, a globe, a belt, footwear, and glasses. ***** [the number of the light emitting devices attached in these objects / one] The three-dimensions [in / it is detected by the photodetection means of a pair at least, and / the real space of a luminescence means] coordinate which the light from a light emitting device becomes from a CCD camera, an infrared sensor, etc. is computed.

[0032] The 12th invention of this application offers the luminescence means attached in the real actuation object which the player of the game equipment concerning said 1st invention operates in real space. This luminescence means measures the location of said real actuation object in said real space, and emits light in the light which

can sense a location measurement means to output a measurement result to said game equipment.

[0033] This luminescence means is attached and used for the real actuation object which the player of the game equipment concerning said 1st invention operates. A luminescence means will be attached and used for these if real actuation objects are the object put on by the player, for example, a globe and a hat, a belt, footwear, etc.

[0034] The 13th invention of this application offers a location detection means equipped with the means of following A-C to detect the location of the real actuation object which the player of game equipment operates in real space.

A; -- the luminescence means attached in said real actuation object in said real space, and B; -- the light from said luminescence means is detected -- at least -- the photodetection means of a pair, and C; -- a measurement means to be based on said detected light, to measure the location of said luminescence means in said real space, and to output a measurement result to said game equipment.

[0035] This location detection means contains the CCD camera of the pair attached in the right-and-left upper part of the case of for example, game equipment, and the infrared light emitting device prepared in a real actuation object. The player in real space is the game system which performs a game in a virtual space, and the 14th invention of this application offers a game system equipped with the means of following A-E.

The real actuation object which the A; aforementioned player operates in said real space, B; A display means to display the virtual actuation object which is a permutation object in said virtual space of said real actuation object, C; A location detection means to detect the location (henceforth a real space location) of said real actuation object in said real space, D; A location [in / for said detected real space location / said virtual space] A coordinate transformation means to change for (calling it a virtual space location hereafter), and to determine the display position of said virtual actuation object on said display means based on said virtual space location, E; by making detection of said real space location by said location detection means, and the display position of said virtual actuation object by said coordinate transformation means determine for deltaT every predetermined time interval A means of operation to display on said display means a motion of said virtual actuation object corresponding to a motion of said real actuation object operated by said player, and this game system consist of the game equipment and the real actuation object concerning the 1st invention, and a display. The same operation effectiveness as the 1st invention is done so.

[0036]

[Embodiment of the Invention] In <outline of invention> this invention, a motion of the real actuation object which a player operates in real space R is displayed as a motion of the virtual actuation object in the game space G as it is. For example, if it is the versus fighting game to which a player fights with an enemy with a sword, a motion of the sword which a player shakes or is poked will be changed and displayed on a motion of the sword object for beating an enemy in the game space G. Moreover, for example, when a player performs a tennis game in the game space G, a motion of the field of the racket which a player swings is changed and displayed on a motion of the racket showing a player of a character in the game space G.

[0037] Moreover, this invention is applicable also to games other than a versus fighting game. For example, the game which obtains a score is considered by making a character jump in the game space G, and avoiding an obstruction. In order to make a virtual actuation object into a character and to change a motion of the player itself into a motion of a character, it is good to make a player equip with a hat, footwear, glasses, a belt, a globe, etc., and to use these wearing objects as a real actuation object.

[0038] Game structure-of-a-system drawing 1 concerning the example of a <example of 1st operation gestalt> (1) book operation gestalt is the block diagram showing the game system 1000 which is the example of 1 operation gestalt of the game system concerning this invention. This game system 1000 has a control section 1, the image-processing section 2, the speech processing section 3, semiconductor memory 4, the control unit 5, and the location detecting element 6.

[0039] The control section 1 has CPU10, ROM18, and RAM19. CPU10 realizes two or more functions mentioned later based on the data for games memorized by OS and RAM19 which are recorded on ROM18. ROM18 stores OS for making basic actuation perform in each part of the game system 1000. RAM19 is used as a work area of saving temporarily the various data for games read from the disk control section 4 if needed.

[0040] The image-processing section 2 has GPU (Graphics Processing Unit)21, the frame buffer 22, and the monitor 23. GPU21 writes CG image which consists of combination of a polygon in a frame buffer 22 based on the count result of CPU10. CG image in which drawing processing was carried out by GPU21 is temporarily

recorded on a frame buffer 22. CG image recorded on the frame buffer 22 is read by the monitor 23, and is displayed. By performing continuously record to the drawing processing and the frame buffer 22 by GPU21, a motion of CG image containing an animation element, for example, a character, is displayed on a monitor 23. [0041] The speech processing section 3 is equipped with SPU (Sound Processing Unit)31 and a loudspeaker 32. SPU31 reproduces music and a sound effect based on voice data currently recorded on semiconductor memory 4, such as music data and various sound effect data.

[0042] Semiconductor memory 4 is recording the game program. The control unit 5 has the real actuation object 51 and the controller 52. The real actuation object 51 is an input means for moving the virtual actuation object which is a permutation object of this real actuation object 51 in the game space G, when a player operates this real actuation object 51 in the real space R which can measure the location detecting element 6. Moreover, the real actuation object 51 may be used as an output means only as an input means. For example, if an oscillating means is formed in the real actuation object 51 and a virtual actuation object and an object collide in the game space G, vibrating the oscillating means of the real actuation object 51 will be mentioned. Controllers 52 are a predetermined switch, a carbon button, an operating lever, a foot pedal, etc. A controller 52 is an input means for operating the object and said virtual actuation object in the game space G, when a player operates these.

[0043] The location detecting element 6 is a means for detecting the location of the real actuation object 51 in said real space R. For example, the location detecting element 6 is constituted using the luminescence means attached in the observation constant object 51, and one pair of sensors which detect the light from said luminescence means. Furthermore, the location detecting element 6 determines the positional information which pinpoints the location in said real space R based on the detected light, and contains the test section sent out to a control section 10. The positional information sent out to a control section 10 is expressed with the three-dimension coordinate of for example, the real space R, the number of the small space which divided real space into small space, etc.

[0044] It is also possible to change into said luminescence means and sensor, and to use the ultrasonic dispatch means attached in the real actuation object 51 and one pair of sensors which receive the sound from said ultrasonic dispatch means.

[0045] (2) Example (2-1) game system general drawing 2 of a game system is an appearance perspective view of the versus fighting game system 2000 which is one example of said game system 1000. This versus fighting game system 2000 shows an example at the time of applying this invention to a versus fighting game. The versus fighting game system 2000 has game equipment 100 and the sword type actuation object 200 which is an example of the real actuation object 51. The sword type actuation object 200 is connected with game equipment 100 by RS232C etc. Moreover, as for the sword type actuation object 200, the power supply cable from game equipment 100 is connected.

[0046] The monitor 101 for an image output is formed in the case transverse-plane upper part of game equipment 100. CCD camera 102a and b which are an example of the sensor contained in the location detecting element 6 are attached in topmost part right and left of a case. CCD cameras 102a and b detect the light from the luminescence means attached in the predetermined location of the sword type actuation object 200.

Although not illustrated, based on the light detected by CCD camera 102a and b, a location measurement means to pinpoint the luminescence location in real space R is connected to CCD camera 102a and b. From up back right and left of a case, one pair of bars 103 have projected toward the front, and the protection curtain 104 is attached in this bar. The protection curtain 104 is a curtain for not inflicting an injury on a perimeter, when a player brandishes the sword type actuation object 200 in the play space in front of game equipment 100. The loudspeaker 105 for outputting BGM and the sound effect of a game is attached in the up right-and-left both sides of a monitor 101. The switch 106 for choosing the menu displayed on a monitor 101 is formed in the center of the case lower part. A switch 106 is equivalent to said some of controllers 52. Moreover, the foot pedal 107 is formed in the floor line in transverse plane of a case. When a player steps on this foot pedal on foot, actuation to the sword object which expresses the sword type actuation object 200 in the game space G is performed. This foot pedal 107 is also one example of said controller 52. The coin slot 108 for putting in coin is formed in the center of the case lower part.

[0047] (2-2) Game equipment drawing 3 is the side elevation of the game equipment 100 shown in drawing 2. As shown in this drawing, the bar 103 is projected and formed in the front horizontal direction from the supporting point 110 pivotable focusing on the supporting point 110 of case up back. The gas spring 109 is

attached in the bar 103. Only the predetermined include angle of a bar 103 is pivotable from a horizontal position to the drawing Nakaya mark direction focusing on the supporting point 110 by telescopic motion of a gas spring 109. By attaching a bar 103 in a case pivotable, when people should hang down from the protection curtain 104, the protection curtain 104 can separate from a bar 103, or it can prevent that a burden is placed on a bar 103 too much.

[0048] (2-3) Sword type actuation object drawing 4 is the block diagram showing the detailed structure of the sword type actuation object 200. The sword type actuation object 200 consists of the grip section 201 and a cutting part 202. The cutting part 202 consists of transparent resin etc. Two luminescence means 203a and 203b are attached in the interior of a cutting part 202 2 point Q1 in a different location in accordance with shaft orientations predetermined, and Q2. The light from the luminescence means 203a and 203b is detected by said CCD camera 102a and b, respectively. Especially the luminescence means 203a and 203b can be constituted, for example using the infrared luminescence LED, although not limited. Since there is directivity in the luminescence direction of Luminescence LED, it is desirable to constitute a luminescence means using two or more luminescence LED.

[0049] The oscillating means 204 for vibrating a sword is formed in the interior of the grip section 201. An oscillating means can consist of motors for rotating an eccentric cam and an eccentric cam. If it is judged that the sword object hit the object of an enemy or others in the game space G so that it may mention later, a motor will drive, an eccentric cam will rotate and the sword type actuation object 200 will be vibrated. By adjusting spacing of the driving pulse of a motor, the rotational speed of an eccentric cam can be controlled and the strength of vibration can be attached. Moreover, Switches 205a and 205b are formed in the grip section 201. Switches 205a and b are used in order to direct the selection and decision of a menu which come out on a monitor 101. Furthermore, the cable 206 which transmits the current for driving said motor, and the string for hanging the sword type actuation object 200 on the body are attached in the grip section 201.

[0050] (3) Explain the outline of the versus fighting game performed by the versus fighting game system 2000 using the outline of a versus fighting game next drawing 1, and drawing 5 -18. Drawing 5 is drawing showing one scene of a versus fighting game. Drawing 6 is the explanatory view showing the condition of the player under play. In this game, an enemy with arms, such as a sword, appears one after another, and pounces on a player. A player operates "a sword is shaken", "it poking with a sword", etc. using the sword type actuation object 200 connected with game equipment 100, as shown in drawing 6, and it operates the sword object in the game space G. A sword object is a permutation object in the game space G of said sword type actuation object 200. Moreover, the candle which imitated the score of a player and the residue of a life at the upper left of the screen is displayed. The residue of an enemy's life etc. is displayed on the lower right.

[0051] A player can choose the arms according to the selection and the difficulty of a stage according to difficulty, for example, a throwing knife, a spear, a bow, etc. in advance of initiation of a game. A player moves forward and turns the inside of the game space G by control of a game system. Moreover, only a predetermined distance can progress the inside of game space in the predetermined direction because a player steps on a foot pedal 107. If the enemy who encounters while a player moves in the inside of the game space G is beaten and an enemy is made to follow the injury of the specified quantity, the selected stage can be completed and a player can challenge the stage of the following level. A game is ended when the residue of the life of a player is lost.

[0052] (3-1) Conversion drawing 7 and drawing 8 of a coordinate are the explanatory view showing the view of the coordinate transformation used as the base of this versus fighting game. Three space-coordinates systems are assumed in this game system. The 1st is the sensor system of coordinates for defining the location in real space R with a three-dimensions coordinate on the basis of CCD camera 102a and b. The 2nd is the player system of coordinates for defining the location in real space R with a three-dimensions coordinate on the basis of a player. The 3rd is a game space-coordinates system for defining the location in the game space G with a three-dimensions coordinate.

[0053] (3-1-1) Conversion drawing 7 from sensor system of coordinates to the player system of coordinates in real space R is the explanatory view showing the relation between sensor system of coordinates and player system of coordinates. As real space R, the rectangular parallelepiped of the range detectable by CCD camera 102a and b is assumed. In this example, the rectangular parallelepiped which has floated 50cm as real space R from the floor line on which game equipment 100 was put, and is in the transverse plane of game equipment

100, and touches CCD camera 102a and b is assumed. The height of a rectangular parallelepiped is [200cm and the width of face of 200cm and depth] 150cm. The magnitude of a rectangular parallelepiped is set as the magnitude in which CCD camera 102a and b are detectable, and a player tends to operate.

[0054] First, sensor system of coordinates are explained. Sensor system of coordinates are the system of coordinates which made the zero the top-most vertices S0 equivalent to CCD camera 102a, and took [the x axis] the z-axis for the y-axis caudad in the direction of CCD camera 102b at the game equipment transverse-plane side. Furthermore, sensor system of coordinates divide each side of the rectangular parallelepiped showing real space R into 256, and express each coordinate with the values from 0 to 255. For example, the coordinate of the top-most vertices S1 equivalent to CCD camera 102b is set to (255, 0, 0).

[0055] Subsequently, player system of coordinates are explained. In this example, the zero of player system of coordinates is taken in the location of the foot pedal of a near side rather than CCD camera 102a and b. For example, a foot pedal is game equipment 100 transverse plane, and assumes that it is in the floor line of 60cm this side rather than CCD camera 102a and b. Moreover, y' shaft is taken upward for x' shaft and z' shaft as an axis of coordinates for the respectively same direction as the x axis of said sensor system of coordinates, and the z-axis. Furthermore, the graduation of each axis of coordinates is taken by 1cm unit. When assuming such player system of coordinates, the player coordinate of the intersection P3 at which y' shaft crosses the base of real space R is set to (0, 50, 0). Moreover, the player coordinate of the intersection P2 at which y' shaft crosses the top face of real space R is set to (0, 250, 0).

[0056] As an example changed into a player coordinate, a sensor coordinate considers the zero S0 of sensor system of coordinates. the zero S0 (0, 0, 0) of sensor system of coordinates -- player system of coordinates -- (- it is expressed 75, 250, and -60).

[0057] (3-1-2) Conversion drawing 8 from player system of coordinates to a game space-coordinates system is the explanatory view showing the relation between player system of coordinates and a game space-coordinates system. The game space G is beforehand set as predetermined magnitude by the provider of a game. For example, the game space G of a rectangular parallelepiped with width of face of 2000m, a depth [of 2000m], and a height of 200m is assumed. the direction which took the zero G0 (0, 0, 0) in the center of one base of this rectangular parallelepiped, and met that base -- x'' -- the direction which meets a base in a shaft -- x'perpendicular to 'z'' shaft -- x' -- the direction of facing up perpendicular to 'shaft and z'' shaft -- y'' -- a shaft is taken. Furthermore, the graduation of each shaft is taken at 1m spacing. This direction, x' shaft, and a z'shaft and x' 'shaft and z'' shaft make [y' shaft and a y'' shaft] an opposite direction relation between player system of coordinates and a game space-coordinates system, respectively.

[0058] Suppose that it is in agreement of the zero G0 of a game space-coordinates system, and the zero P0 of player system of coordinates at the beginning [of a game] of initiation. Then, the zero of a game space-coordinates system and player system of coordinates shifts gradually by moving forward, when a player steps on a foot pedal 107, or moving forward or rotating a player by the game side. the coordinate (- 75, 250, -60) of the player system of coordinates which show the zero S0 of sensor system of coordinates when both zero is in agreement -- a game space-coordinates system -- setting (75, 250, 60) -- it becomes. In addition, it does not pass over each conversion of system of coordinates mentioned above to an example, but such coordinate transformation is performed using the approach generally learned as affine transformation.

[0059] In this versus fighting game system 2000, two locations in the real space R of Q1 and Q2 of said sword type actuation object 200 are pinpointed by sensor system of coordinates, and, subsequently the coordinate is further changed into player system of coordinates to a game space-coordinates system. By carrying out perspective-projection conversion of the coordinate in a game space-coordinates system, the display position of the sword object on a monitor 101 is determined, and a sword object is displayed. A game can be performed without sensing the sense of incongruity of real space and game space, when self operates rather than it says that a player operates the object in game space by this coordinate transformation.

[0060] (3-2) **** which CPU performs -- explain the processing which CPU10 performs with reference to drawing 1 again. CPU10 has the amendment means 11, the difficulty selection means 12, the three-dimension input conversion means 13, the hit judging means 14, the sound output-control means 15, the actuation judging means 16, and the situation judging means 17.

[0061] The amendment means 11 performs processing which amends the height difference of a player. For example, the amendment means 11 sets height of a criteria player to 170cm, and performs amendment

processing which prevents un-arranging [which was performed when the small child with whom height does not fill it was a player and the sword object was displayed only down the screen].

[0062] Specifically, the amendment means 11 urges the style of criteria to a player in advance of initiation of a game. Drawing 9 is an example of a screen which the amendment means 11 displays, in order to urge the style of criteria to a player. The amendment means 11 guesses the physique of a player from the location of the sword type actuation object 200 in this style, and determines a correction factor. For example, the amendment means 11 decides beforehand the criteria height of the sword type actuation object 200 when carrying out the style of criteria to be 120cm. The amendment means 11 will determine "2" as a correction factor, if the height of the sword type actuation object 200 detected from the style of the criteria of a player is 60cm of the one half of criteria height. Henceforth, the amendment means 11 multiplies the height of the sword type actuation object 200 detected by the correction factor 2, and even if it is a child with the small body, the same display effectiveness as a criteria player is acquired. It is also possible to use that the properties of a motion of the sword type actuation object 200 differ, and to ask for a correction factor according to the physique of a player, in fact. A motion of the sword type actuation object 200, it is specifically expressed with the change in the past of the combination of the location and sense. For example, the approach of computing a correction factor from distribution of the successive range of the sword type actuation object 200 is mentioned.

[0063] The difficulty selection means 12 receives selection of the difficulty of a game after the correction factor decision by the amendment means 11, or before decision. Selection of the arms according to difficulty may be received difficulty or after difficulty selection. The difficulty selection means 12 receives the selection using the switch 106 attached in game equipment 100, and the switch 205 of the sword type actuation object 200. In addition, the difficulty selection means 12 will display a marker on the intersection of the linear production and monitor 101 which connected luminescence means 203a and b, if it points to the menu which the player chose with the sword type actuation object 200. Furthermore, the difficulty selection means 12 receives selection of the menu by pushing a switch 205, after the marker and the menu have been in agreement. Drawing 10 is an example of the difficulty selection screen which the difficulty selection means 12 displays. The marker who shows the sense of the sword type actuation object 200 is displayed on "beginners' class mode."

[0064] The three-dimension input conversion means 13 performs coordinate transformation processing which changes luminescence means 203a of the sword type actuation object 200, and the sensor coordinate of b into a player coordinate and game space coordinates. Based on the called-for game space coordinates, the display position on the monitor of a sword object is computed, and a display is performed. The three-dimension input conversion means 13 performs coordinate transformation processing every predetermined time interval, for example, 16msec(s). Thereby, a motion of the sword type actuation object 200 which a player operates is displayed as a motion of the sword object currently displayed on the monitor 101. Therefore, for a player, a game can be performed with the feeling that he is operating, rather than the feeling of operating the sword object.

[0065] For example, as shown in drawing 11 (a), when a player shakes the sword type actuation object 200, as shown in this drawing (b), a motion of the sword object on a screen is displayed similarly. Moreover, the locus of a sword object is also displayed in this drawing (b). Moreover, if a player carries out actuation which stops an enemy's sword using the sword type actuation object 200 when the enemy who appeared attacks to a player, as shown in drawing 12 (a) and (b), a motion of a sword object will be displayed similarly.

[0066] The hit judging means 14 judges whether the sword object hit other items in an enemy or game space, for example, a bamboo, and a stone in the game space G. In this game system, since motions of the sword object operated by the player are arbitrary motions which cannot predict a system side, the hit judging means 14 memorizes the locus of the sword object in the past predetermined time Δt , in order to perform said judgment.

[0067] Drawing 13 is the conceptual explanatory view of the locus table which has memorized two game space coordinates of q1 and q2 to time series of a sword object. This 2 point q1 and two q2 are the points corresponding to Q1 and Q2 of the sword type actuation object 200. This locus table memorizes 2 point q1 of a sword object [in / when / of the sword type actuation object 200 / detecting two locations of Q1 and Q2 / the whole 16msec(s) / in the three-dimensions input conversion means 12 / less than 256 msec of past], and the game space coordinates of q2 to time series. This table is held at RAM19.

[0068] The hit judging means 14 asks for two straight lines showing a part for the cutting part of a sword object

of a sword object based on the game space coordinates of q1 and q2. For example, it can consider that a point q1 is a root for a cutting part, the point q3 of expressing the point of a sword for a cutting part can be searched for, and the straight line which connects points q1 and q3 can express a part for a cutting part. The point of a sword q3 is a point on the straight line which connects said points q1 and q2, and it can ask for it as a point which only the fixed distance d separated from the point q1 to the point q2-way. The hit judging means 14 computes the field which expresses the locus of the straight line for said cutting part using a locus table. It judges whether the hit judging means 14 has objects, such as an enemy's sword, an enemy's body, and a bamboo, in the computed field, and the hit judging of what the sword object hit is performed.

[0069] Moreover, the hit judging means 14 judges the rate of a sword object from the movement magnitude of q1 and q2 for every 16msec. The hit judging means 14 performs the judgment of whenever [hitting / it / deeply / -according to rate of sword object or it hit shallowly hit]. Furthermore, the hit judging means 14 hits by which location of a sword object hit with other objects, and performs the judgment of whenever. In other words, the judgment of whenever [hit] is performed by which location of the field showing the locus for said cutting part hit with other objects. For example, the hit judging means 14 judges whenever ["only dress's was turned off" "it was agonized", "it went out to bone", "wide swing", etc. hit].

[0070] In addition, also when the coordinate of the sword object memorized when a motion of a sword type actuation object is early, and other objects do not overlap, it thinks. For example, at time of day T1, a sword object is the case where it is in an enemy's left-hand side, and is in an enemy's right-hand side at the next time of day T2. Even if it is such a case, the hit judging means 14 is judged from the locus for a cutting part of a sword object to be "a hit."

[0071] The sound output-control means 15 makes the sound effect data read from semiconductor memory 4 to RAM19 output to a loudspeaker 32 according to the result of a hit judging. As a sound effect, the sound which a sword and a bamboo hit, the sound in which an enemy's dress is torn with a sword, and the sound in which a sword swings wide are mentioned, for example. Since a sound effect changes by the result of said hit judging, the presence of a game increases.

[0072] The actuation judging means 16 judges whether the convention command was inputted based on the locus of a sword object. A convention command is inputted by the predetermined pattern of the locus of a sword object, and delivers an attack to an enemy. The convention command and the predetermined pattern of a locus are memorized by RAM19 (not shown). For example, if it judges whether the actuation judging means 16 inputted the "cross-shaped" pattern whose player is mortal work based on said locus table and this pattern is inputted, an attack memorized corresponding to the "" pattern will be delivered. Thereby, a player can have the feelings that its actuation is performing the game increasingly.

[0073] Moreover, the actuation judging means 16 judges whether the foot pedal 107 was stepped on. When it steps on, only the count stepped on advances the location of the zero P0 of the player system of coordinates in the game space G. The distance which pushes on at once is beforehand decided to be 1m. According to advance of a player, the game space coordinates of a sword object also move the actuation judging means 16. Drawing 14 is an example of a screen which shows change of a display when a foot pedal 107 is stepped on. Since the enemy is establishing drawing 14 (a) in the distance, the case where it does not arrive even if it shakes a sword object is shown. Drawing 14 (b) is an example of a screen which shows that the player stepped on the foot pedal as shown in drawing 14 (c), the enemy was approached, and it attacked. The enemy who was in the distance zooms in and is displayed so that it may illustrate. A player can perform a game by actuation of oneself using the whole body of attacking with treading-in actuation, and can sense presence much more.

[0074] In addition to these processings, the actuation judging means 16 judges further whether the player used predetermined arms, for example, a throwing knife. For example, when switch 205a and b which direct use of arms after the sword type actuation object 200 has pointed out the enemy on a screen are pushed, an attack to the enemy who was able to be stuck is delivered. When [of the sword type actuation object 200] two productions of Q1 and Q2 intersect the enemy on a screen, as for the actuation judging means 16, it is desirable to display the pointer in which it is shown that the player is targeting the enemy.

[0075] The situation judging means 17 computes the remainder of the life of whenever [injury / of an enemy], or a player according to the result of said hit judging, or the result of an actuation judging. For example, as a result of a hit judging, when only an enemy's dress is torn, whenever [injury / of an enemy] is "0." When the case where an enemy is burdened at a scratch, and one enemy are beaten, only the predetermined degree at

which whenever [injury / of an enemy] was appointed according to each case increases. A hit degree and the increment frequency of whenever [injury / of an enemy] are memorized by RAM19 (not shown).

[0076] Moreover, when it is judged that the situation judging means 17 had the input of a convention command and use of arms as a result of said actuation judging, only the frequency according to a convention command or the used arms makes whenever [injury / of an enemy] increase. A convention command and arms, and the increment frequency of whenever [injury / of an enemy] are memorized by RAM19 (not shown).

[0077] On the other hand, the situation judging means 17 updates the life of a player according to an enemy's location in the game space G, the location of a player, and actuation of a player. It is considered that the location of a player is the zero of player system of coordinates. When a player is not able to prevent an enemy's attack, only a predetermined rate decreases the life of a player per an enemy's attack. Drawing 15 is an example of a screen which shows that the amount of remainder of the life of the player which received an enemy's attack with the situation judging means 17 is updated.

[0078] Furthermore, the situation judging means 17 drives the motor built in the sword type actuation object 200 according to the hit degree by the driving pulse, and performs processing which vibrates the sword type actuation object 200. When realizing not only the vision on a screen but the thing hit also physically by this vibration, since the strength of vibration changes with whenever [hit], a player serves as a game with a touch of reality.

[0079] (3-3) Flow drawing 16 -19 of processing are a flow chart which shows the flow of the overall procedure in this versus fighting game system 2000. Hereafter, the flow of processing of this game system is concretely explained along these drawings.

[0080] (3-3-1) Maine processing drawing 16 is a flow chart which shows the flow of the Maine processing of this game system. This processing is started when a player throws coin into the coin slot 108 of game equipment 100.

[0081] Step S1; the amendment means 11 performs the above-mentioned amendment processing, and computes the correction factor for amending the physique of a player. About this processing, it mentions later (refer to drawing 17 mentioned later).

[0082] Step S2; the difficulty selection means 12 performs difficulty selection processing, and receives selection of the stage of a beginners' class person, a middle-class person, an upper person, etc. prepared for every level. About this processing, it mentions later (refer to drawing 18 mentioned later). In addition, difficulty selection processing may be performed in advance of said amendment processing.

[0083] Step S3; a data load is performed after amendment processing and difficulty selection processing. That is, data required for a game program or advance of a game are read into RAM19 from semiconductor memory 4. If initiation preparation of a game is completed, a game screen as shown in said drawing 11 will be displayed, and a game will be started.

[0084] Step S4; processing of steps S5-S18 is performed at intervals of predetermined time after game initiation. This time interval is set to 16msec(s) in this example.

Step S5; the three-dimensions input conversion means 13 acquires the sensor coordinate in the real space R of the sword type actuation object 200 from the location detecting element 6 every 16msec.

[0085] Step S6; subsequently the three-dimensions input conversion means 13 changes further into a player coordinate the sensor coordinate which performed coordinate transformation processing and was acquired to game space coordinates. About this processing, it mentions later. The computed game space coordinates are written in the locus table of RAM19 by the hit judging means 14.

[0086] Step S7; perspective-projection conversion of the game space coordinates computed by the three-dimensions input conversion means 13 is carried out, and the display position on the monitor 101 of a sword object is computed. Thereby, a sword object is displayed on a monitor 101. That is, a sword object will be displayed every 16msec(s) during advance of a game.

[0087] Step S8, S9, S10; the per judging means 14 asks for the locus of the sword in less than 256 msec of past from a locus table, and judges whether the sword object has hit with objects other than an enemy or an enemy (S8). If it has hit, calculation of whenever [injury / of the enemy by having hit] will be performed by the situation judging means 17 (S9). However, if the object which hit is not an enemy, whenever [injury / of an enemy] will not change. Moreover, the sword type actuation object 200 vibrates according to whenever [object / which hit / , or hit] (S10). The situation judging means 17 changes output spacing of the driving pulse

of the motor built in the sword type actuation object 200 according to the strength of whenever [hit], and adjusts the strength of vibration of the sword type actuation object 200. For example, when a vibration strong when an enemy is beaten is grazed, the reality of a game can be raised by giving a weak vibration to the sword type actuation object 200.

[0088] Step S11; the sound output-control means 15 outputs a sound effect according to the result of a hit judging.

Steps S12 and S13; it judges whether the actuation judging means 16 had the input of a convention command. This decision asks for the locus of the sword object in the game space G based on a locus table, and judges it by whether a locus corresponds to a predetermined pattern. On the occasion of this decision, a certain amount of error from a predetermined pattern is permitted. When it corresponds to the input of a convention command, only the part according to a convention command raises whenever [enemy injury], and the situation judging means 17 updates a display (S13). Nothing is performed when there is no input of a convention command.

[0089] Steps S14, S15, and S16; the actuation judging means 16 displays a pointer, when the sword type actuation object 200 judges whether the enemy on a monitor 101 is targeted and makes it the target (S14). The circle which surrounds as a pointer the enemy currently targeted, for example is mentioned. Where this pointer is displayed, when arms are used (S15), only the frequency according to arms makes whenever [injury / of an enemy] increase, and the situation judging means 17 updates a display (S16).

[0090] Step S17; the situation judging means 17 calculates the residue of the life of a player by whether the sword of a player defended an enemy's attack, and updates a display. For example, when it is judged that an enemy's sword and the sword of a player hit in said hit judging means, it can be judged that an enemy's attack was defended. On the contrary, when the enemy and sword object which have been attacked have not hit, it can be judged that the player received the damage.

[0091] Step S18; if it is judged whether all the stages corresponding to the selected difficulty were completed and it is judged that it ended, it will shift to step S19. If it is judged that it has not ended, processing S4-S18 will be again repeated every return and 16msec to step S4.

[0092] Steps S19, S20, S21, and S22; when it is judged whether the selected stage was clearable and it has not cleared, termination of a game is displayed and a game is completed (S20). When it has cleared, the play result of a player is displayed (S21). Furthermore, the check screen of whether to continue to a player is displayed (S22). Selection of "continuation" performs return and the above-mentioned processing S2 to said step S2 again. Selection of "termination" terminates a game.

[0093] (3-3-2) Amendment processing drawing 17 is a flow chart which shows the flow of the amendment processing performed at step S1 of said Maine processing. The amendment means 11 displays the screen which directs the style of criteria to a player (S(refer to said drawing 9) 101). Then, the amendment means 11 carries out fixed time amount standby, and detects 2 point Q1 of the sword type actuation object 200, and the sensor coordinate of Q2 (S102). Then, the height of a player is guessed from the read sensor coordinate, and a correction factor is determined.

[0094] (3-3-3) Difficulty selection processing drawing 18 is a flow chart which shows the flow of the difficulty selection processing performed at said step S2. This flow explains flowing in the case of choosing a menu with the sword type actuation object 200.

[0095] Steps S201, S202, and S203; the difficulty selection means 12 reads 2 point Q1 of the sword type actuation object 200 predetermined, and the sensor coordinate of Q2 (S201). Subsequently, the difficulty selection means 12 computes the intersection of the production of the sword type actuation object 200 and monitor 101 in real space (S202). Furthermore, the difficulty selection means 12 computes the screen coordinate which displays the computed intersection (S203).

[0096] Steps S204, S205, and S206; the difficulty selection means 12 displays a marker on the location of the screen coordinate searched for (S204). If one switch 205 of the sword type actuation objects 200 is pushed after this marker and the alternative of a menu have lapped (S205), the difficulty selection means 12 will determine difficulty (S206).

[0097] In addition, as mentioned above, selection of difficulty or arms may be received from the switch of the body of game equipment, or the switch of the sword type actuation object 200.

(3-3-4) Coordinate transformation processing drawing 19 is a flow chart which shows the flow of the coordinate transformation processing performed at step S6 of said Maine processing.

[0098] Step S601; the three-dimensions input conversion means 13 amends the sensor coordinate [in / two points / the real space R of Q1 and Q2] of a sword type actuation object with the correction factor for which it asked at said step S1. Thereby, even if a physique difference is in a player, actuation of all players becomes being the same as that of actuation of a standard player.

[0099] Step S602; subsequently, the three-dimensions input conversion means 13 changes the value of the amended sensor coordinate into the player coordinate which is the coordinate value of player system of coordinates (S602), and changes a player coordinate into the coordinate value of a game space-coordinates system further (S603). Then, perspective-projection conversion of the game space-coordinates value of the sword type actuation object 200 is carried out, and the display position to a monitor 101 top is computed (S604).

[0100] Depending on the class of other example games of the conversion from a location in the location in game space in <example of other operation gestalt> (A) real space, or the class of virtual actuation object, the location in real space R and the location in the game space G may be pinpointed not by the three-dimensions coordinate but by other approaches. for example, real space R and the game space G -- two or more real cels r1 and r2 of respectively predetermined magnitude ... and the virtual cels g1 and g2 -- it divides into ... and the cel storage section which memorizes the cel number which identifies each cel, and the location of each cel is prepared further.

[0101] In this case, the three-dimensions input conversion means 13 changes the three-dimensions coordinate from the location detecting element 6 into a real cel number, changes a real cel number into a virtual cel number further, and determines a display position based on a virtual cel number.

[0102] (B) It is also possible for the zero of player system of coordinates to take and to set up the zero of other example player system of coordinates of the direction and the graduation of an axis of coordinates for every player. If player system of coordinates are set up for every player, the physique difference of a player is absorbable with a setup of player system of coordinates. For example, the amendment means 11 memorizes the player system of coordinates about the player of the physique used as criteria. And if it judges that it is a player with the larger physique than criteria from the physique of the player computed based on the criteria pause, while lowering the location of the zero of player system of coordinates rather than a criteria location, spacing of the graduation of an axis of coordinates will be extended. Reverse processing will be performed if the physique of a player is a player smaller than criteria.

[0103] (C) The following approaches can also be used in order to accelerate the decision whether it hit or not depended on a judgment means per other example above of a hit judging. Drawing 20 R> 0 (a) shows the location in the time of day T1 for the cutting part of the sword object in the game space G, and the location in the time of day T2 after T1 to 16msec(s) in a straight line. This drawing (b) shows the case where a part for the cutting part of a sword object is transposed to the set of the point of N individual. This drawing (c) shows the case where the locus for a cutting part of the sword object during the time of day T1 and T2 in drawing (b) is complemented with the set of the point of a 1-set N individual.

[0104] In order to perform the hit judging during time of day T1 and T2, the hit judging means 14 complements the locus for a cutting part in respect of plurality, as shown in this drawing (c) from change of the location for a cutting part shown in this drawing (a). Subsequently, the hit judging means 14 computes the distance of the target object and the point of performing a hit judging, about all points. If this distance is less than a predetermined value, it will be judged that it hit with said object.

[0105] (D) Other example aforementioned actuation judging means 16 of an input judging of a convention command can also make a judgment whether the convention command was inputted as follows. Drawing 21 R> 1 is the conceptual explanatory view of real space R divided into a suitable number of small space (henceforth a cel). the above-mentioned (A) -- the same -- real space R -- two or more real cels r1 and r2 -- it divides into ... and the cel number for identifying each cel is given to each fruit cel. As for the actuation judging means 16, Q1 and Q2 memorize two cel numbers in predetermined time deltaT3 in order of [said / which passed the cel] the sword type actuation object 200. Furthermore, the actuation judging means 16 compares the passage pattern and convention pattern of a real cel from the memorized cel number, and judges whether the convention command was inputted.

[0106] (E) Two or more oscillating means may be formed in a real actuation **** actuation object. For example, in the case of a sword type actuation object, it is possible to form an oscillating means in the both ends

of a sword, to make it vibrate by reinforcement which has responded to the location where the sword object hit other objects, shifts, and is different in that oscillating means or both oscillating means, and to realize a more real feel.

[0107] Moreover, output means other than an oscillating means may be attached in a real actuation object. For example, it is thought that a sound output means, an optical output means, etc. may be attached in a real actuation object according to the property of a game.

[0108] (F) The record medium which recorded the game program which makes a computer perform a program and the record-medium aforementioned game approach, and this program and in which computer reading is possible is also contained in the range of this invention. Here, as a record medium in which computer reading is possible, the thing of the floppy disk which can write a computer, a hard disk, semiconductor memory, CD-ROM, DVD, a magneto-optic disk (MO), and others is mentioned.

[0109]

[Effect of the Invention] If this invention is used, a motion of the real actuation object which a player operates in real space can be expressed on a display as a motion of the virtual actuation object in game space. For the player which operates a virtual actuation object, since a game can be performed with the feeling of operating rather than the feeling of operating it, a more real game can be enjoyed.

[Translation done.]

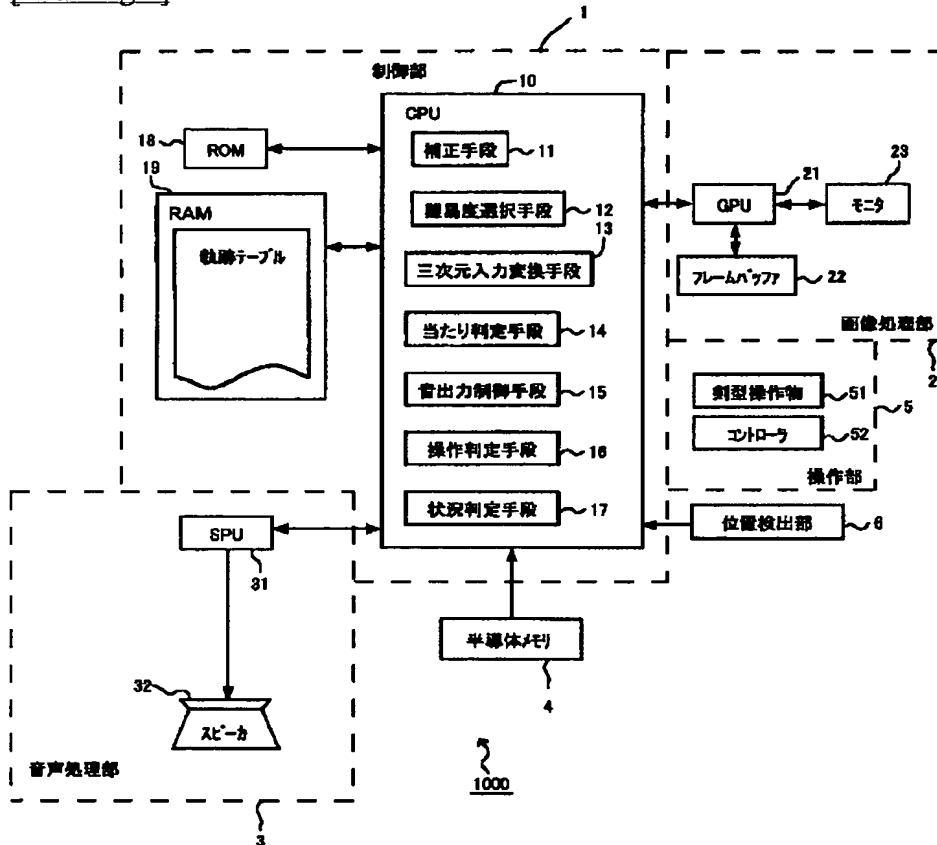
* NOTICES *

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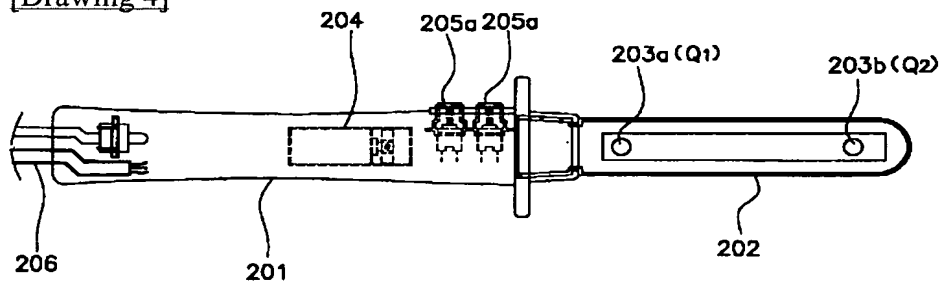
- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

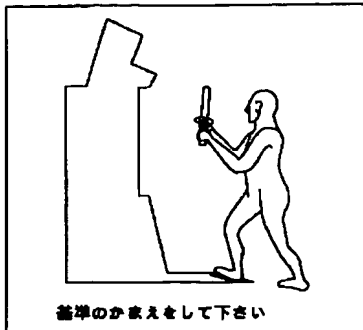


[Drawing 4]



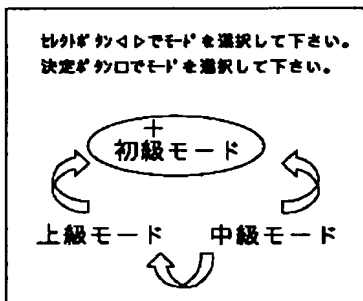
[Drawing 9]

基準位置選択画面

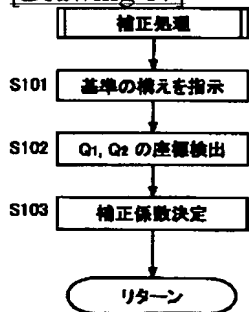


[Drawing 10]

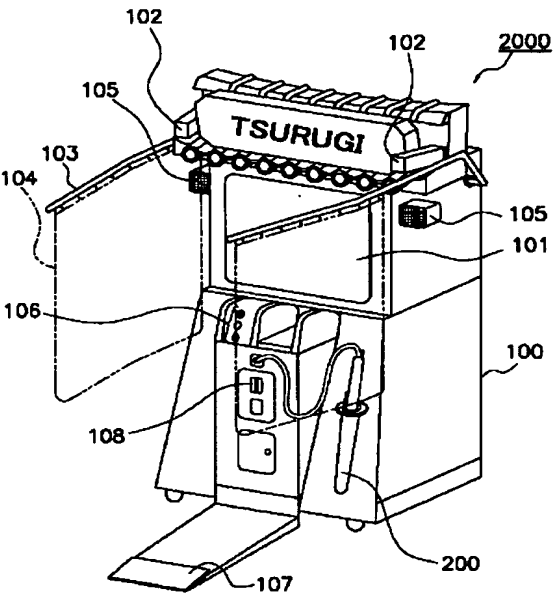
難易度設定画面



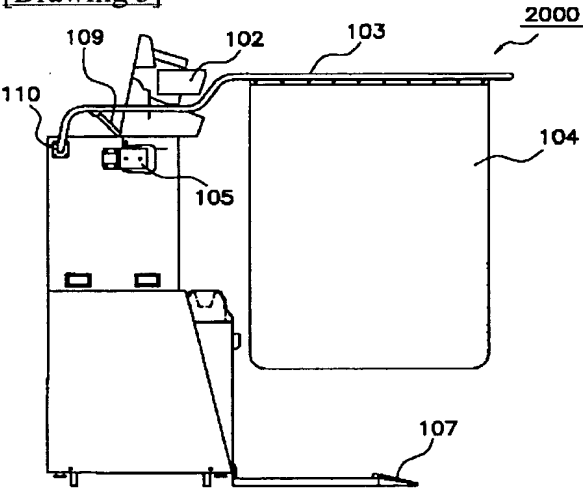
[Drawing 17]



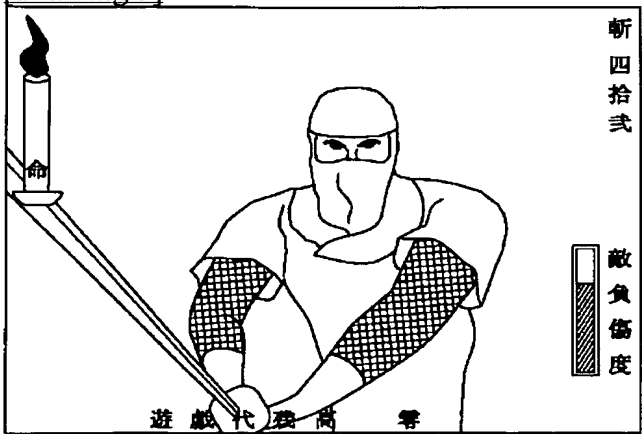
[Drawing 2]



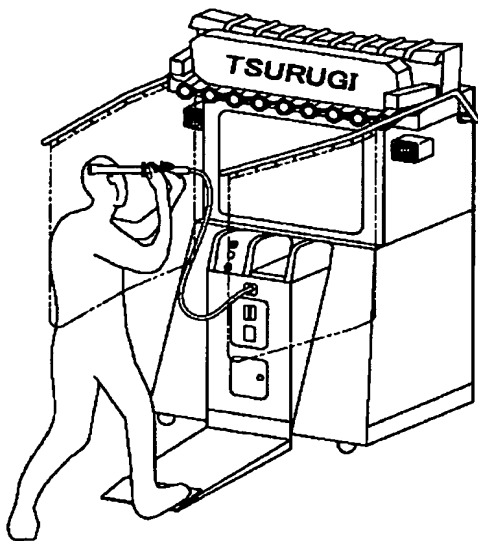
[Drawing 3]



[Drawing 5]

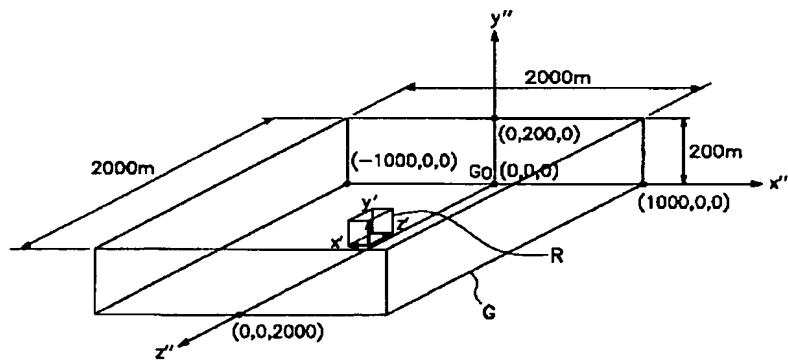


[Drawing 6]

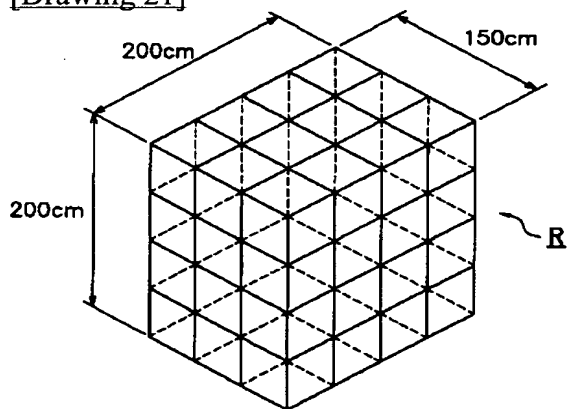


[Drawing 8]

ゲーム空間座標とプレーヤ空間座標との関係

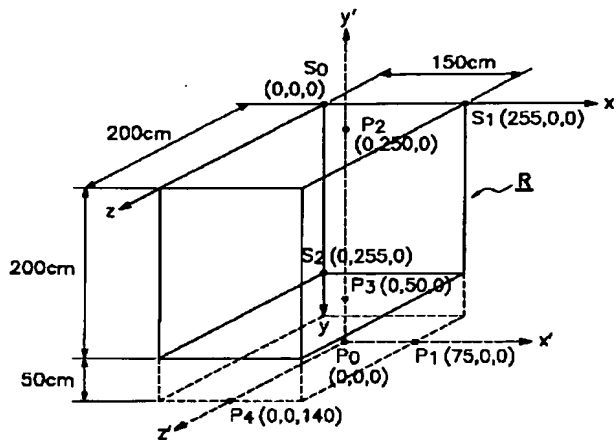


[Drawing 21]



[Drawing 7]

空間座標とプレーヤ空間座標との関係

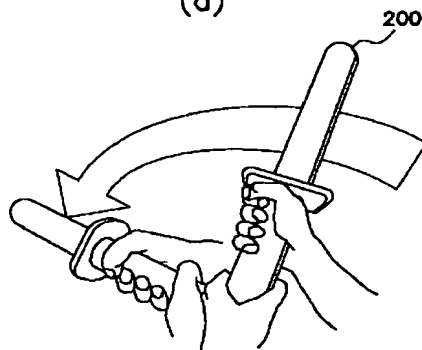


[Drawing 11]

(b)



(a)

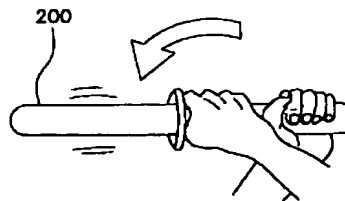


[Drawing 12]

(a)



(b)

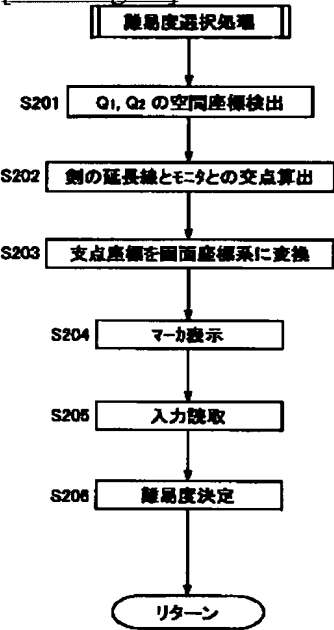


[Drawing 13]

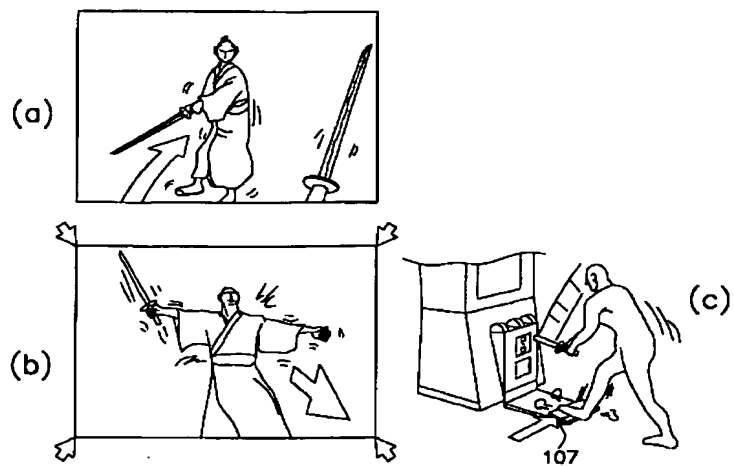
過去Δt内における剣オブジェクトの軌跡

	Q1	Q2
t1	(a1, b1, c1)	(p1, q1, r1)
t2	(a2, b2, c2)	(p2, q2, r2)
t3	(a3, b3, c3)	(p3, q3, r3)
t4	(a4, b4, c4)	(p4, q4, r4)
t5	(a5, b5, c5)	(p5, q5, r5)
t6	(a6, b6, c6)	(p6, q6, r6)
t7	(a7, b7, c7)	(p7, q7, r7)
t8	(a8, b8, c8)	(p8, q8, r8)
t9	(a9, b9, c9)	(p9, q9, r9)
t10	(a10, b10, c10)	(p10, q10, r10)
t11	(a11, b11, c11)	(p11, q11, r11)
t12	(a12, b12, c12)	(p12, q12, r12)
t13	(a13, b13, c13)	(p13, q13, r13)
t14	(a14, b14, c14)	(p14, q14, r14)
t15	(a15, b15, c15)	(p15, q15, r15)
t16	(a16, b16, c16)	(p16, q16, r16)

[Drawing 18]



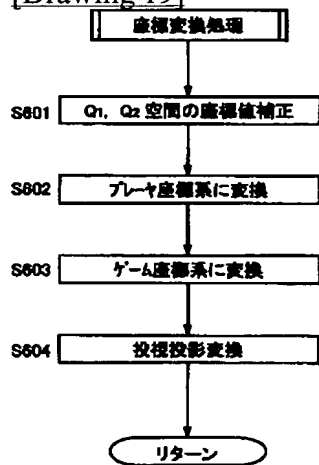
[Drawing 14]



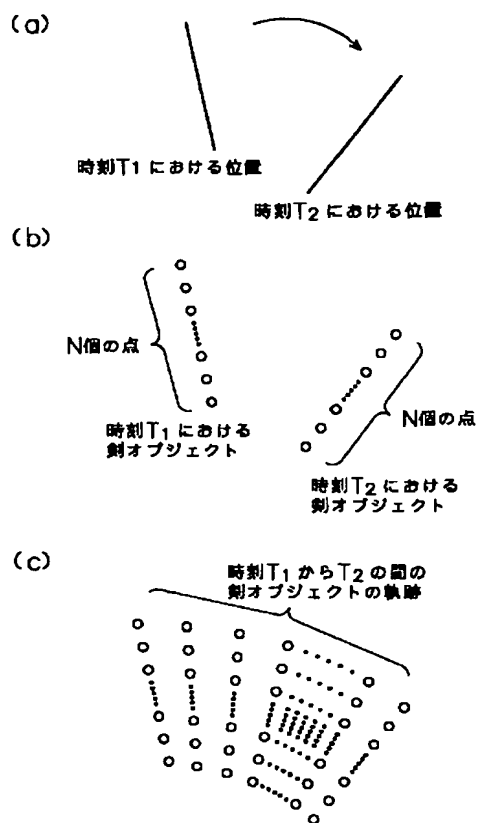
[Drawing 15]



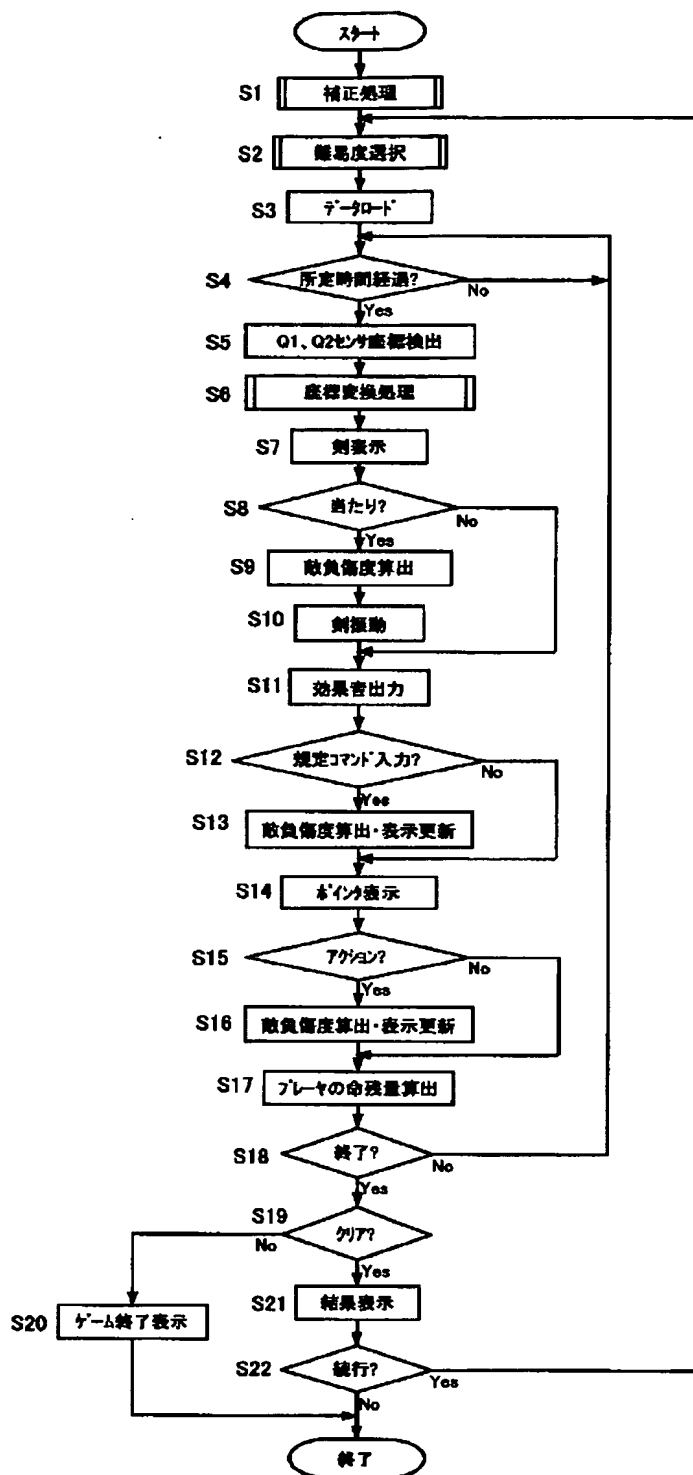
[Drawing 19]



[Drawing 20]



[Drawing 16]



[Translation done.]